

What Is Claimed Is:

1. An RF multilayer circuit board comprising:
 - a first conductive device in a first plane for providing a first RF signal line;
 - a first reference potential plane in a second plane for providing a reference potential of the first RF signal line;
 - at least one second reference potential plane in a third plane for providing a reference potential of an at least second RF signal line;
 - at least one second conductive device in a fourth plane for providing a second RF signal line;
 - a plated through hole device for electrically connecting the first and second conductive devices, the first and second reference potential planes between them each having a recess in an area of the plated through hole device; and
 - at least one additional conductive device in the area of the plated through hole device at least between the first and second reference potential planes and bonding them in order to provide a waveguiding channel around the plated through hole device.
2. The RF multilayer circuit board according to claim 1, wherein the additional conductive device extends between the first and fourth planes in the area of the plated through hole device.
3. The RF multilayer circuit board according to claim 1, wherein, in the area of the plated through hole device, the additional conductive device has a plurality of cylindrical, conductive vias that are substantially coaxial to the plated through hole device, the vias forming a semicircle of at least one row.
4. The RF multilayer circuit board according to claim 1, further comprising a dielectric material that stiffens the circuit board and is situated in a gap space between the first and second reference potential planes, the dielectric material having a dielectric constant ϵ_r , which corresponds to that of a softboard material in an area of at least one of the first and fourth planes.

5. The RF multilayer circuit board according to claim 1, wherein situated between the first and second reference potential planes are a plurality of reference potential planes which have recesses of varying size in the area of the plated through hole device.
6. The RF multilayer circuit board according to claim 1, wherein the additional conductive device in the area of the plated through hole device has a plurality of cylindrical vias that form a ring around the plated through hole device.
7. The RF multilayer circuit board according to claim 1, wherein a recess filled with a dielectric is situated at least between the first and second reference potential planes in the area of the plated through hole device, a wall have a conductive material in an area of the recess and forming the additional conductive device in the area of the plated through hole device.
8. The RF multilayer circuit board according to claim 1, wherein a metal-plated, tubular device forms the additional conductive device in the area of the plated through hole device.
9. The RF multilayer circuit board according to claim 1, wherein a material having a low loss factor at high frequencies is situated in the area of the additional conductive device in the area of the plated through hole device.